

Honors Algebra 2 Midterm REVIEW PACKET

Name: Key

Solve the system.

1. $2x + y = 3$

$y = -2x + 3$

$-2x^2 + 8x + y = -33$

$-2x^2 + 8x + (-2x + 3) = -33$

$-2x^2 + 6x + 3 = -33$

$0 = 2x^2 - 6x - 36$

$0 = 2(x^2 - 3x - 18)$

$0 = 2(x - 6)(x + 3)$
 $x = 6 \quad x = -3$

$(6, -9)$
 $(-3, 9)$

2. $y + 6x = -3x^2$

$-3x^2 - 12x - 12 + y = 0$

$-(3x^2 + 6x + y = 0)$

$-3x^2 - 12x + y = 12$

$-3x^2 - 6x - y = 0$

$-3x^2 - 12x + y = 12$

$-6x^2 - 18x = 12$

$-6x^2 - 18x - 12 = 0$

$-6(x^2 + 3x + 2) = 0$

$-6(x + 2)(x + 1) = 0$

$x = -2 \quad x = -1$

$y = -3x^2 - 6x$

$(-2, 0)$
 $(-1, 3)$

Solve the equation. Check your solution(s).

3. $\sqrt{2x-1} = x-8$

$2x-1 = (x-8)(x-8)$

$2x-1 = x^2 - 16x + 64$

$0 = x^2 - 18x + 65$

$0 = (x-13)(x-5)$

$x = 13 \quad x \neq 5$

$\sqrt{2(13)-1} = 13-8 \quad \sqrt{2(5)-1} = 5-8$
 $5 = 5 \checkmark \quad 3 = -3 \times$

$x = 13$

4. $\sqrt{9x+13} = 2$

$9x+13 = 4$

$x = -1$

$\sqrt{9(-1)+13} = 2$
 $2 = 2 \checkmark$

$x = -1$

5. $\sqrt[3]{5x} + 14 = 20$

$\sqrt[3]{5x} = 6$

$5x = 7776$

$x = 1555.2$

$\sqrt[3]{5(1555.2)} + 14 = 20$
 $20 = 20 \checkmark$

$x = 1555.2$

Factor the polynomial completely.

6. $t^3 + 3t^2 + 4t + 12$

$t^2(t+3) + 4(t+3)$

$(t^2 + 4)(t + 3)$

7. $m^3 - 13m^2 + 40m$

$m(m^2 - 13m + 40)$

$m(m-5)(m-8)$

8. $5n^5 + 4n^4 - 9n^3$

$n^3(5n^2 + 4n - 9)$ -45

$n^3(5n+9)(5n-5)$

$n^3(5n+9)(n-1)$

$n^3(5n+9)(n-1)$

Divide using polynomial long division.

9. $(3x^2 + 5x + 4) \div (x + 1)$

$$\begin{array}{r} 3x + 2 + \frac{2}{x+1} \\ x+1 \overline{) 3x^2 + 5x + 4} \\ \underline{- 3x^2 + 3x} \\ 2x + 4 \\ \underline{- 2x + 2} \\ 2 \end{array}$$

$3x + 2 + \frac{2}{x+1}$

10. $(9x^4 - 5x^3 + x^2 + 4x) \div (x^2 + 2x + 3)$

$9x^2 - 23x + 20 + \frac{33x - 60}{x^2 + 2x + 3}$

$$\begin{array}{r} x^2 + 2x + 3 \overline{) 9x^4 - 5x^3 + x^2 + 4x + 0} \\ \underline{- 9x^4 + 18x^3 + 27x^2} \\ -23x^3 - 26x^2 + 4x \\ \underline{- 23x^3 - 46x^2 - 69x} \\ 20x^2 + 73x + 0 \\ \underline{- 20x^2 + 40x + 60} \\ 33x - 60 \end{array}$$

$33x - 60$

Decide whether the function is a polynomial function. If so, write it in standard form and state its degree, type, and leading coefficient.

11. $f(x) = \frac{1}{6}x - 10x^2 - 4x^4 + 10$

Polynomial function, $f(x) = -4x^4 - 10x^2 + \frac{1}{6}x + 10$
Quartic, leading coefficient is -4

Solve the system.

12. $-x - 5y - 5z = 2$

$4x - 5y + 4z = 19$

$x + 5y - z = -20$

$4x - 5y + 12 = 19$

$4x - 5y = 7$

$x + 5y - 3 = -20$

$x + 5y = -17$

$5x = -10$

$x = -2$

$-2 + 5y - 3 = -20$
 $5y - 5 = -20$

$(-2, -3, 3)$

Write a rule for g described by the transformations of the graph of f . Then identify the vertex.

13. $f(x) = (x - 6)^2 - 4$; horizontal shrink by a factor of $\frac{1}{3}$ and a translation 2 units down, followed by a reflection in the x -axis.

$f(x) = (3x - 6)^2 - 4$

$f(x) = (3x - 6)^2 - 6$

$f(x) = -(3x - 6)^2 + 6$

$f(x) = -(3x - 6)^2 + 6$

Find the product.

14. $(8d + 8)^3$

$(8d + 8)(8d + 8)(8d + 8)$

$(64d^2 + 64d + 64d + 64)$

$(64d^2 + 128d + 64)(8d + 8)$

$512d^3 + 512d^2 + 1024d^2 + 1024d + 512d + 512$

$512d^3 + 1536d^2 + 1536d + 512$

15. $(3x^2 + 3x - 5)(2x^4 - 5x^2 + 3)$

$6x^6 - 15x^4 + 9x^2 + 6x^5 - 15x^3 + 9x - 10x^4 + 25x^2 - 15$

$6x^6 + 6x^5 - 25x^4 - 15x^3 + 34x^2 + 9x - 15$

Write the expression in simplest form. Assume all variables are positive.

16. $\sqrt[6]{\frac{576q^{29}r^7}{9q^5r^5}}$

$\sqrt[6]{64q^{24}r^2}$
 $\hat{8} \cdot \hat{8}$
 $\hat{4} \cdot \hat{2} \cdot \hat{4} \cdot \hat{2}$
 $2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2$

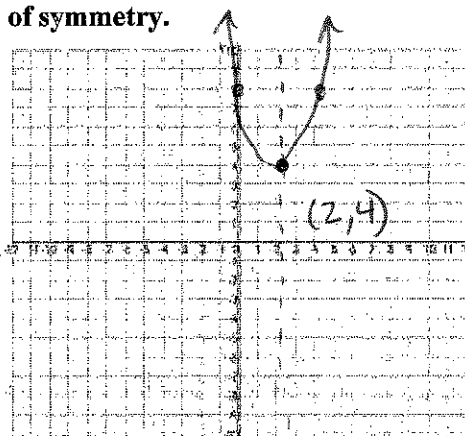
$2q^4\sqrt[6]{r^2}$

Graph the function. Label the vertex and axis of symmetry.

17. $f(x) = (x-2)^2 + 4$

$y = (0-2)^2 + 4$

$y = 8$



$x = 2$

18. Find the indicated real n th root(s) of a .

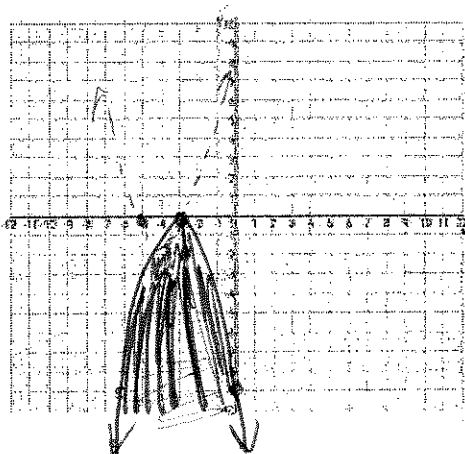
$n = 5, a = 243$

$\sqrt[5]{243} = 3$

Graph the system of quadratic inequalities.

19. $y \leq -x^2 - 6x - 9$

$y < x^2 + 8x + 15$



Find all zeros of the polynomial function.

20. $g(x) = x^4 + x^3 + 34x^2 + 36x - 72$

$$\begin{array}{r|rrrrr} -2 & 1 & 1 & 34 & 36 & -72 \\ & \downarrow & -2 & & -72 & -72 \\ \hline & 1 & -1 & 36 & -36 & 0 \end{array}$$

$$x^3 - x^2 + 36x - 36 = 0$$

$$\begin{array}{r|rrrr} 1 & 1 & -1 & 36 & -36 \\ & \downarrow & 1 & 0 & 36 \\ \hline & 1 & 0 & 36 & 0 \end{array}$$

$$x^2 + 36 = 0$$

$$x^2 = -36$$

$$x = \pm 6i$$

$$x = -2$$

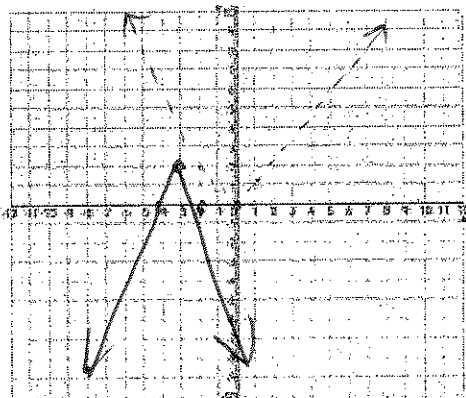
$$x = 1$$

$$x = 6i$$

$$x = -6i$$

Graph the function and its parent function. Then describe the transformation.

21. $g(x) = -2|x+3| + 2$



Write the expression in simplest form.

22. $\frac{\sqrt[3]{3}}{\sqrt[3]{16}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{6}}{2}$

$$\begin{aligned} 1^5 &= 1 \\ 2^5 &= 32 \\ 3^5 &= \\ 4^5 &= \end{aligned}$$

23. $\frac{1(8+\sqrt{2})}{(8-\sqrt{2})(8+\sqrt{2})} = \frac{8+\sqrt{2}}{64-2}$

$$\frac{8+\sqrt{2}}{62}$$

Write a polynomial function f of least degree that has a leading coefficient of 1 and the given zeros.

24. $5, -7 - \sqrt{10}$

$$(x-5)(x-(-7-\sqrt{10}))(x-(-7+\sqrt{10}))$$

$$(x-5)(x+7+\sqrt{10})(x+7-\sqrt{10})$$

$$x^2 + 7x - x\sqrt{10} + 7x + 49 - x\sqrt{10} + x\sqrt{10} + 7x\sqrt{10} + 49\sqrt{10} - 10$$

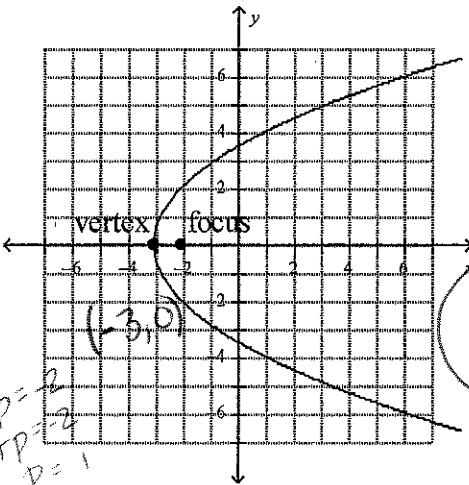
$$(x^2 + 14x + 39)(x-5)$$

$$x^3 - 5x^2 + 14x^2 - 70x + 39x - 195$$

$$x^3 + 9x^2 - 31x - 195$$

Write an equation of the parabola shown.

25.



Vertex

h, k

$$(-3, 0)$$

Focus

$$(-2, 0)$$

$$(h+p, k)$$

$$h+p = -2$$

$$-3+p = -2$$

$$p = 1$$

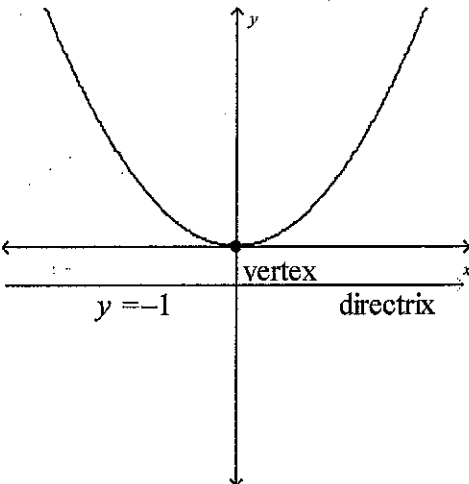
$$x = h-p$$

$$x = -3$$

$$x = \frac{1}{4p}(y-k)^2 + h$$

$$x = \frac{1}{4}y^2 - 3$$

26.



$$y = \frac{1}{4p}x^2$$

$$y = \frac{1}{4}x^2$$

Solve the equation.

27. $x^2 + 4x + 10 = 0$

$$x = \frac{-4 \pm \sqrt{(4)^2 - 4(10)}}{2}$$

$$x = \frac{-4 \pm \sqrt{-24}}{2}$$

$$x = \frac{-4 \pm i\sqrt{24}}{2}$$

$$x = \frac{-4 \pm 2i\sqrt{6}}{2}$$

$$x = \frac{-4 \pm 2i\sqrt{6}}{2}$$

$$x = -2 \pm i\sqrt{6}$$

28. $w^4 + 12 = 7w^2$

$$w^4 - 7w^2 + 12 = 0$$

$$(w^2 - 3)(w^2 - 4) = 0$$

$$(w^2 - 3)(w + 2)(w - 2) = 0$$

29. $(x - 2)^2 = 9$

$$x - 2 = \pm 3$$

$$x = 2 \pm 3$$

$$x^2 - 3 = 0$$

$$x^2 = 3$$

$$x = \pm\sqrt{3}$$

$$w = 2$$

$$w = -2$$

$$w = \sqrt{3}$$

$$w = -\sqrt{3}$$

$$x = 5$$

$$x = -1$$

30. $6x = -x^2 - 19$

$$x^2 + 6x + 19 = 0$$

$$x = \frac{-6 \pm \sqrt{(6)^2 - 4(19)}}{2}$$

$$x = \frac{-6 \pm \sqrt{-40}}{2}$$

$$x = \frac{-6 \pm 2i\sqrt{10}}{2}$$

$$x = -3 \pm i\sqrt{10}$$

31. $2(x + 9)^2 - 4 = 7$

$$(x + 9)^2 = \frac{11}{2}$$

$$x + 9 = \pm \sqrt{\frac{11}{2}}$$

$$x = -9 \pm \frac{\sqrt{22}}{2}$$

32. $3a^6 + 9a^5 = -6a^4$

$$3a^4 + 9a^5 + 6a^4 = 0$$

$$3a^4(a^2 + 3a + 2) = 0$$

$$3a^4(a + 2)(a + 1) = 0$$

$$a = 0$$

$$a = -2$$

$$a = -1$$

Find the minimum or maximum value of the function. Describe the domain and range of the function, and where the function is increasing and decreasing.

33. $y = -\frac{1}{2}x^2 - x - 4$

Vertex: $(-1, -3.5)$

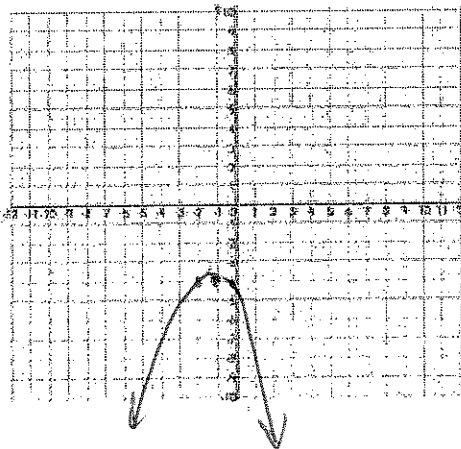
Maximum: $(-1, -3.5)$

Domain: $(-\infty, \infty)$

Range: $(-\infty, -3.5]$

Inc: $(-\infty, -1)$

Dec: $(-1, \infty)$



Simplify the expression.

34. $\sqrt[4]{625n^8t^{16}}$

$5n^2t^4$

Describe the end behavior of the graph of the function.

35. $g(x) = 8 - 8x^3 + 5x^6 - 10x^2 + 15x$

$g(x) \rightarrow -\infty$ as $x \rightarrow -\infty$

$g(x) \rightarrow \infty$ as $x \rightarrow \infty$

Determine whether the function is even, odd, or neither.

36. $g(x) = -8x^5 - 8x^3 + 6x$

odd

Write an equation of the parabola in intercept form.

37. x-intercepts of -2 and -6; passes through (-1, -1)

$y = a(x+2)(x+6)$

$-1 = a(-1+2)(-1+6)$

$-1 = 5a$ $a = -\frac{1}{5}$

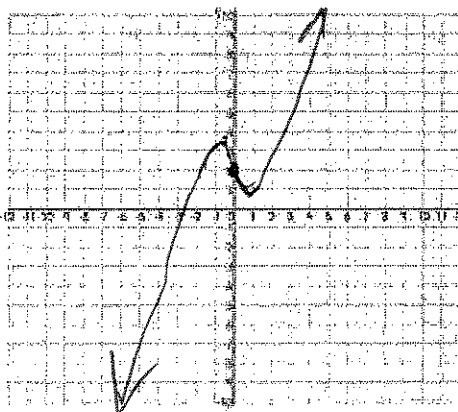
$y = -\frac{1}{5}(x+2)(x+6)$

Graph the polynomial function.

38. $g(x) = -2x + x^3 + 2$

max: $(-0.82, 3.1)$

min: $(0.82, -0.91)$



Find the zero(s) of the function.

39. $h(x) = 2x^2 + 36x + 162$

$$0 = 2x^2 + 36x + 162$$

$$0 = 2(x^2 + 18x + 81)$$

$$0 = 2(x + 9)(x + 9)$$

$$x = -9$$

40. $h(x) = -x^2 - 245$

$$0 = -x^2 - 245 \quad x = \pm\sqrt{245}$$

$$245 = -x^2$$

$$-245 = x^2$$

$$x = \pm\sqrt{245}$$

$$5.49$$

$$5.77$$

$$x = \pm 7\sqrt{5}$$

41. Use the *linear regression* feature on a graphing calculator to find the line of best fit for the data in the table. Estimate the height (in centimeters) of a person whose femur is 38 centimeters long.

Femur length (centimeters), x	Height (centimeters), y
39	171
44	184
31	152
49	196
36	163
40	175
29	142
33	152
46	186
44	183

$$y = 2.6x + 68.6$$

$$y = 167.4 \text{ cm}$$

Write a function g whose graph represents the indicated transformation of the graph of f .

42. $f(x) = 4|x + 5| - 8$; vertical shrink by a factor of $\frac{1}{2}$

$$\frac{1}{2} (4|x + 5| - 8)$$

$$g(x) = 2|x + 5| - 4$$

Divide using synthetic division.

43. $(2x^2 + 4x - 7) \div (x + 1)$

$$\begin{array}{r|rrr} -1 & 2 & 4 & -7 \\ & \downarrow & -2 & -2 \\ \hline & 2 & 2 & -9 \end{array}$$

$$2x + 2 - \frac{9}{x+1}$$

44. $(2x^4 + 3x^3 - 12x^2 - 24x - 6) \div (x + 2)$

$$\begin{array}{r|rrrrr} -2 & 2 & 3 & -12 & -24 & -6 \\ & \downarrow & -4 & 2 & 20 & 8 \\ \hline & 2 & -1 & -10 & -4 & 2 \end{array}$$

$$2x^3 - x^2 - 10x - 4 + \frac{2}{x+2}$$

Find the real solution(s) of the equation. Round your answer to two decimal places when appropriate.

45. $(x + 8)^4 = 625$

$$x + 8 = \pm 5$$

$$x = -3$$

$$x = -13$$

Perform the operation. Write the answer in standard form.

46. $(-13 - 7i) - (6 + 2i)$

$$-19 - 9i$$

47. $(-1 + 8i)^2$

$$(-1 + 8i)(-1 + 8i)$$

$$1 - 8i - 8i + 64i^2$$

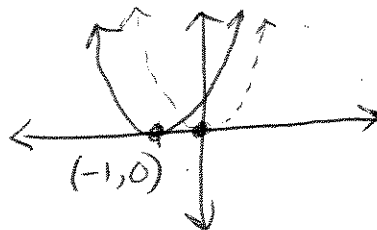
$$1 - 16i - 64$$

$$-63 - 16i$$

Describe the transformation of $f(x) = x^2$ represented by g . Then graph each function.

48. $g(x) = (x + 1)^2$

The graph of g is a translation 1 unit left.



Find the sum.

49. $(-2x^4 + 5x^3 - 7x^2 + 3) + (-2x^3 - 9x^2 + 2x - 6)$

$$-2x^4 + 3x^3 - 16x^2 + 2x - 3$$

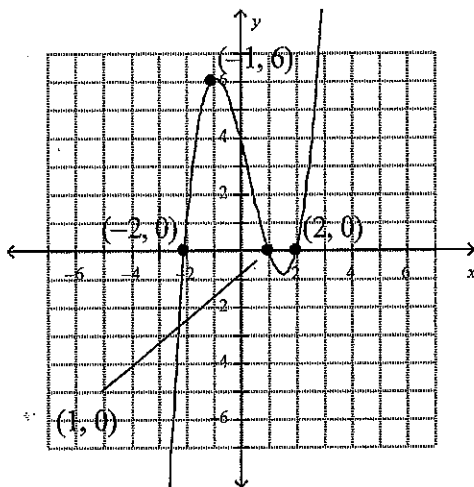
Find all real solutions of the equation.

50. $x^3 - 6x^2 + 3x + 10 = 0$

$x = -1$
 $x = 2$
 $x = 5$

Write a cubic function whose graph passes through the given points.

51.



$$f(x) = a(x+2)(x-1)(x-2)$$

$$6 = a(-1+2)(-1-1)(-1-2)$$

$$\frac{6}{6} = \frac{6a}{6}$$

$$1 = a$$

$$f(x) = (x+2)(x-1)(x-2)$$

Evaluate the expression using a calculator. Round your answer to two decimal places when appropriate.

52. $\sqrt[6]{46,656}$

6

OPEN-ENDED QUESTIONS COME FROM:

Page 137 numbers 27-34

Page 100 numbers 27-34

Page 184 numbers 23-30

Page 202 numbers 9-16

Page 217 numbers 23-30

